

**REMARKS****STATUS OF THE APPLICATION**

The instant application was filed on December 11, 2003 and included claims 1-22. In response to a restriction requirement, claims 10-12 were withdrawn from consideration. Subsequently, claims 10-13 were canceled. In the most recent Office Action, claims 1-9 were rejected and 14-22 were objected to. In view of the amendments to the claims and the discussion presented herein below, Applicants submit remaining claims 1-9 and 14-22 are patentable over the cited prior art and the instant application is in condition for allowance. An early notification of such allowance is therefore earnestly solicited.

**THE OFFICE ACTION**

The Office has objected to claims 14-22 under 37 C.F.R. 1.75(c) as being of improper dependent form as being dependent on a canceled claim.

The Office has rejected claims 1 and 4-9 under 35 U.S.C. 102(b) as anticipated by or alternatively under 35 U.S.C. 103(a) as obvious over Cui et al. (Cui).

Also, the Office has rejected claims 1-2 and 4-5 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,613,362 ('362) to Welter, et al.

The Office has also rejected claims 3 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,613,362 ('362) to Welter, et al. in view of U.S. Patent No. 5,976,276 ('276) to Sapru et al.

## **DISCUSSION**

### **The Objection to the Claims**

The Office has objected to claims 14-22 under 37 C.F.R. 1.75(c) as being of improper dependent form as being dependent on a canceled claim.

Applicants have amended claims 14 and 16 to correct the improper dependency and as such this objection is now moot.

### **The Rejection Under 35 U.S.C. 102(b)/103(a)**

The Office has rejected claims 1 and 4-9 under 35 U.S.C. 102(b) as anticipated by or alternatively under 35 U.S.C. 103(a) as obvious over Cui et al. (Cui).

Cui teaches sintered particles consisting of 90wt.%  $Mg_2Ni$  and 10 wt.%  $Ti_2Ni$ . These particles are electrolessly coated with a Ni-P material.

Regarding claim 1, the Ni-P coating on the particles of Cui is not disclosed to be a hydrogen desorption catalyst. In fact this coating is disclosed as "beneficial in terms of reducing the capacity decay rate and improving the cycle life of  $Mg_2Ni$  electrodes." (See right hand column of page 264.) Thus the coating reduces the rate at which the KOH in the battery electrolyte corrodes the  $Mg_2Ni$  material. Further Cui states (right hand column of page 265):

It is well known that a Ni-P coating on an  $Mg_2Ni$  alloy powder surface can effectively protect the alloy from oxidation in KOH solution. Simultaneously, the coating acts as an electrocatalyst for hydrogen ion reduction. . .

Thus, the material is not described as a hydrogen desorption catalyst, but as a protective coating and an electrocatalyst to electrochemically reduce hydrogen ions. The Office has

ignored the fact that claim 1 does not call for just any catalyst, but specifically calls for a hydrogen desorption catalyst. The Office misreads the claim to require "a continuous or semi-continuous layer of catalytic material on the surface of said magnesium-based hydrogen storage alloy" when the claim actually calls for:

... wherein said hydrogen desorption catalyst is insoluble in said magnesium-based hydrogen storage alloy and is in the form of a continuous or semi-continuous layer of catalytic material on the surface of said magnesium-based hydrogen storage alloy. . .

Thus just any catalyst won't do. It must be a hydrogen desorption catalyst. The Office further suggests that because Cui says that the material helps the hydride/dehydride reaction of the  $Mg_2Ni$  alloy it must be the catalyst called for in claim 1. However, the Office once again ignores that the claim calls for a hydrogen desorption catalyst. This Ni-P catalyst is an electrochemical catalyst that assist in converting  $H^+$  ions to neutral H atoms. A hydrogen desorption catalyst assist in a totally different reaction, i.e.  $MH \rightarrow M + H$ . The electrocatalyst helps the hydriding and dehydriding by making H more or less available but does not actively participate in the production of H from MH (i.e. desorption of H). Therefore, Ni-P is not disclosed as a hydrogen desorption catalyst and all of the limitations of claim 1 are not disclosed or fairly suggested in Cui.

Further, regarding claim 4, there is no iron in the Ni-P surface coating of Cui as is required by claim 4. Thus Cui does not teach or fairly suggest all of the limitations of claims 1 and 4-9 and the rejection thereof over Cui is untenable. Applicants respectfully request the withdrawal of this rejection.

The Rejections Under 35 U.S.C. 103(a)

Also, the Office has rejected claims 1-2 and 4-5 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,613,362 ('362) to Welter, et al.

The Office has also rejected claims 3 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,613,362 to Welter, et al. (Welter) in view of U.S. Patent No. 5,976,276 ('276) to Sapru et al. (Sapru)

Welter teaches Mg or Mg alloy particles with homogeneously distributed iron particles dispersed throughout. These iron particles are distributed throughout the bulk of the Mg powder particulate. Thus, some of the iron particles will be at the surface of the Mg powder particulate. However, Welter does nothing to concentrate the iron particles on the surface of the Mg. That is, Welter either a) homogeneously mixes Mg powder particles with iron powder particles, sinters the mix, and comminutes the sintered mass back into powder, or 2) melts Mg, creates a slurry of the molten Mg and solid iron powder particles, spray quenches the Mg slurry into powder particles. None of the processes used by Welter in any way cause the iron particles to be distributed inhomogeneously on the surface of the Mg particles. A consequence of this homogeneous distribution is that the distribution of iron particles on the surface of the Mg powder particulate is equal to the volumetric distribution of the particles.

We can use the weight percentages and the densities of the components to get a rough estimate of the volume percentages of each component. Turning first to the example given in column 3, 10wt.% iron and 90wt% Mg are combined. To determine the volumetric distribution we need the densities of iron and Mg. We use 7.87 g/cm<sup>3</sup> as the density of iron and 1.74 g/cm<sup>3</sup> as the density of Mg. Taking a basis of 100g of Mg/iron

mixture, we have 10g of iron or  $1.27 \text{ cm}^3$  of iron and 90g of Mg or  $51.72 \text{ cm}^3$  of Mg. Thus we have a total of  $52.99 \text{ cm}^3$  and the volumetric % of the components is 2.4% iron and 97.6% Mg. Thus for this example, only about 2.4% of the surface of the particles are iron. This is clearly not "continuous" or "semi-continuous" in any sense of the words.

The Office suggests that we can just increase the amount of iron used in Welter and eventually it will form a continuous layer on the Mg particulate. However, Welter specifically states that 20% by weight of iron is the upper limit. See column 4, lines 35-36. However, even at 20wt.% iron, the volume percentage of iron is only 5.24%. Once again not continuous or semi-continuous. Thus all of the limitations of claim 1 are not taught or fairly suggested by Welter.

Regarding claim 2, the office suggests that the "up to 20wt% iron" that Welter adds to the Mg forms an alloy with the Mg. However, the iron remains separate solid particles in the Mg matrix. Welter does disclose Mg alloys such as "magnesium-nickel, magnesium-copper or lithium-containing, zinc-containing or manganese-containing magnesium." See column 4, lines 40-43. However, Welter does not disclose any compositions for these alloys, let alone that the Mg alloy has at least 80at.% Mg.

Finally, in response to Applicants' previous arguments related to Welter, the Office has pointed to the words "continuous or semi-continuous" in the Welter specification and suggested that Welter creates a continuous or semi-continuous granulate which would be exposed after the chipping or comminuting, therefore, Welter would read on the present invention. It should be noted that the use of the phrase "continuous" or "semi-continuous" appears three places in the Welter specification. A reading of the specification shows that the terms have absolutely nothing to do with any coating on the surface of the particles of

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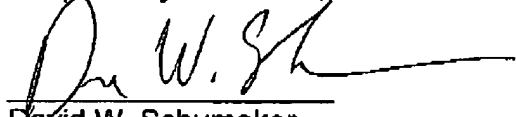
Welter. The term is used in conjunction with the fabrication process/manufacturing apparatus for making the particles. That is, the process for manufacturing is continuous or semi-continuous, or the apparatus is useful for continuous or semi-continuous production of the mg/iron particles. Thus, there is nothing in Welter that suggest any continuous or semi-continuous coating of iron on the surface of Mg-alloy particles. As such, the rejections of claim 1-2 and 4-5 under 35 U.S.C. 103(a) as being unpatentable over Welter and claim 3 as being unpatentable over Welter in view of Sapru are untenable and should be withdrawn. Applicants hereby request the withdrawal thereof.

#### CONCLUSION

Claims 1-9 and 14-22 remain at issue. In view of the amendments to claims 14 and 16, and the discussion above, applicants submit that the present application is now in condition for allowance and earnestly request the re-examination and timely notice of allowance thereof.

Should the Examiner have an comments or suggestions which would place the instant application in better condition for allowance, he is earnestly requested to contact the undersigned.

Respectfully submitted,



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